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Generalized additive partial linear models with high-dimensional covariates

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We study generalized additive partial linear models when the dimensions of both nonlinear and linear covariates diverge with the sample size. We are interested in which components (including parametric and nonparametric ones) are nonzero. The additive nonparametric functions are approximated by polynomial splines. We propose a doubly penalized procedure to obtain an initial estimate and then use the adaptive LASSO to identify nonzero components and to obtain the final selection and estimation results. We establish selection and estimation consistency of the estimator as well as asymptotic normality for the estimator of the parametric components by employing a penalized quasi-likelihood. Thus our estimator is shown to have an asymptotic oracle property. Monte Carlo simulations show the proposed procedure works well with moderate sample sizes. An empirical example is examined to illustrate the application of the method.

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